

ABSTRACT OF THE DISCLOSURE

Physical systems, each having three energy levels, in the solid substance arranged in a resonator are provided in which two of three transitions are  
5 optically allowed and a qubit is expressed by either of quantum states of two levels constituting the remaining optically forbidden transition or by the superposition state thereof. Two physical systems selectively irradiated with two kinds of light, frequency  
10 difference thereof corresponding to a transition frequency of the optically forbidden transition for respective physical systems, thereby setting initial states. A two-qubit gate operation is performed by irradiating the two physical systems simultaneously  
15 with two kinds of light having frequencies resonant with the optically allowed transitions other than the transitions coupled through the common resonator mode, while increasing an intensity level of one of the two kinds of light and decreasing an intensity level of the  
20 other light between start time and finish time of the simultaneous irradiation.

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